WE CLAIM:

1. An RF semiconductor device comprising:

a high resistivity polysilicon handle wafer;

a buried oxide layer over the polysilicon handle wafer; and,

a silicon layer over the buried oxide layer.

2. The RF semiconductor device of claim 2 further comprising an RF input.

3. An RF semiconductor device comprising:

a high resistivity polycrystalline layer;

a buried oxide layer over the polycrystalline layer; and,

a silicon layer over the buried oxide layer.

4. The RF semiconductor device of claim 3 wherein the polycrystalline layer comprises a polysilicon layer.

5. The RF semiconductor device of claim 3 further comprising an RF input.

6. The RF semiconductor device of claim 5 wherein the polycrystalline layer comprises a polysilicon layer.

7. A method of fabricating an RF semiconductor device comprising:

forming an oxide layer on a surface of a first wafer, wherein the first wafer comprises low resistivity silicon; and,

bonding the oxide layer of the first wafer to a second wafer, wherein the second wafer comprises a high resistivity polysilicon wafer, whereby the RF semiconductor device is produced.

8. The method of claim 7 wherein the bonding of the oxide layer of the first wafer to the second wafer comprises:

implanting low atomic weight atoms in a surface of the second wafer; and,

bonding the oxide layer of the first wafer to the implanted surface of the second wafer.

9. The method of claim 7 wherein the bonding of the oxide layer of the first wafer to the second wafer comprises heating the first and second wafers so as to bond the oxide layer of the first wafer to the second wafer.

10. The method of claim 9 wherein the heating of the first and second wafers so as to bond the oxide layer of the first wafer to the second wafer comprises:

implanting low atomic weight atoms in a surface of the second wafer; and,

heating the first and second wafers so as to bond the oxide layer of the first wafer to the implanted surface of the second wafer.

11. The method of claim 7 further comprising processing the silicon of the first wafer to form an integrated circuit of the RF semiconductor device therein.

12. The method of claim 7 further comprising processing the silicon of the first wafer to form transistors and inductors.

13. A method of fabricating an RF semiconductor device comprising:

forming a first oxide layer on a surface of a first wafer, wherein the first wafer comprises a high resistivity polycrystalline material;

forming a second oxide layer on a surface of a second wafer, wherein the second wafer comprises low resistivity silicon; and,

bonding the first and second oxide layers against one another so as to produce the RF semiconductor device.

14. The method of claim 13 wherein the polycrystalline material comprises polysilicon.

15. The method of claim 13 further comprising removing a portion of the silicon of the second wafer.

16. The method of claim 15 wherein the removing of a portion of the silicon of the second wafer comprises etching away the portion of the silicon of the second wafer.

17. The method of claim 15 wherein the removing of a portion of the silicon of the second wafer

comprises grinding away the portion of the silicon of the second wafer.

18. The method of claim 15 wherein the removing of a portion of the silicon of the second wafer comprises etching and grinding away the portion of the silicon of the second wafer.

19. The method of claim 13 wherein the bonding of the first and second oxide layers against one another comprises heating the first and second wafers so as to bond the first and second oxide layers against one another.

20. The method of claim 13 further comprising processing the silicon of the second wafer to form an integrated circuit of the RF semiconductor device therein.

21. The method of claim 13 further comprising processing the silicon of the second wafer to form transistors and inductors.

22. A method of fabricating an RF semiconductor device starting with a SOI wafer having a top silicon layer, a buried oxide layer, and a bottom silicon layer, the method comprising:

forming a new oxide layer on a surface of the top silicon layer;

forming a high resistivity polysilicon layer over the new oxide layer;

removing the bottom silicon layer of the SOI wafer; and,

removing the buried oxide layer of the SOI wafer so as to produce the RF semiconductor device.

23. The method of claim 22 wherein the forming of a polysilicon layer over the new oxide layer comprises depositing a polysilicon layer on the new oxide layer.

24. The method of claim 23 wherein the removing of the bottom silicon layer of the SOI wafer comprises grinding and/or etching away the bottom silicon layer of the SOI wafer.

25. The method of claim 23 wherein the removing of the buried oxide layer of the SOI wafer

comprises grinding and/or etching away the buried oxide layer of the SOI wafer.

26. The method of claim 25 wherein the removing of the bottom silicon layer of the SOI wafer comprises grinding and/or etching away the bottom silicon layer of the SOI wafer.

27. The method of claim 22 wherein the removing of the bottom silicon layer of the SOI wafer comprises grinding and/or etching away the bottom silicon layer of the SOI wafer.

28. The method of claim 22 wherein the removing of the buried oxide layer of the SOI wafer comprises grinding and/or etching away the buried oxide layer of the SOI wafer.

29. The method of claim 28 wherein the removing of the bottom silicon layer of the SOI wafer comprises grinding and/or etching away the bottom silicon layer of the SOI wafer.

30. The method of claim 22 further comprising processing the silicon remaining from the SOI wafer so as to form an integrated circuit of the RF semiconductor device therein.

31. The method of claim 22 further comprising processing the silicon remaining from the SOI wafer so as to form transistors and inductors.